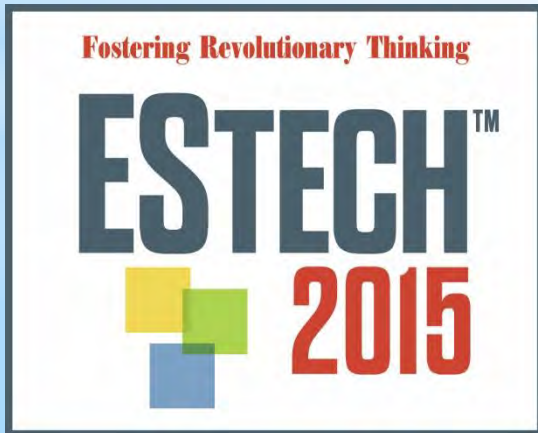




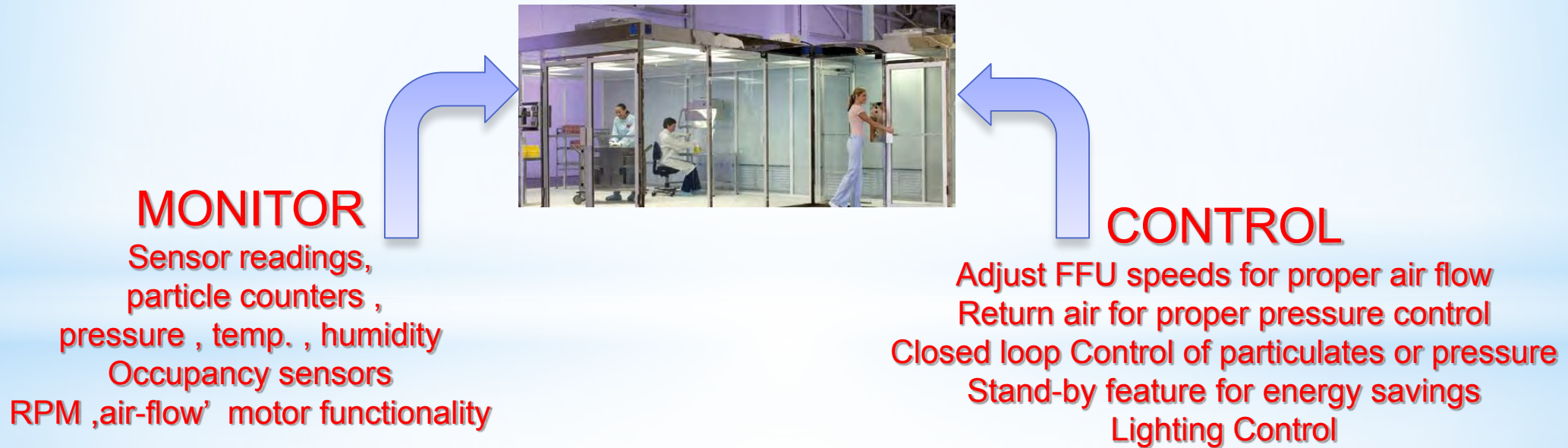
Cleanroom Control Systems Improve Performance

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Cleanroom Controls - Overview

Centralized controls provide environment monitoring and control that can regulate and automatically adjust the clean-air cycling speed.



BENEFITS: *Improved Maintenance Monitoring;
Higher Throughput Yield;
Lower Energy Consumption;
Sensors & Control on one System.*



When Cleanroom Compliance is not enough

* MONITOR

- * FFU performance
- * Occupancy and Cleanroom Performance demands
- * Critical room parameters (air-flow, air-exchanges, pressure, particle counts etc.)
- * Capture and store measurements

* CONTROL

- * Adjust FFU speed (stay compliant, optimize cleanroom performance)
- * Set-Back (clock-calendar unoccupied reduction)
- * Occupancy and Facility loading adjustments
- * Facility Integration (interface with Building Management System)

RESULTS - reduce down-time, improve yields, energy conservation



Control Systems - Popular Features

1. Global->Unit views/control Facility/Group/ Individual
2. Clock/Calendar Set-Back
3. Remote Set-Back, override
4. Emergency Shut-Down
5. Alarm
 1. Local alarm on Console
 2. Remote Alarm trigger
 3. Fault notification (sms text or e-mail)
6. Pressure Monitoring
7. Temperature/Humidity monitoring
8. Closed Loop Control
9. Particle Counter integration
10. Building Management Coordination
11. Data Logging



View and Control Levels

Facility Control acknowledge ALARM ↑

85 fans 5 groups

SPM lab Laser cleanroom MPE gown room MPE lab 1 MPE lab 2

Set speeds 0 offline 0 stop 84 run 0 stdby 1 errors

MPE lab 1 ↑

Set speeds 0 offline 9 stop 24 run 0 stdby 0 errors

Fan# 8 MPE lab 1 next fan + ↑

Fan status: **Running** 0 RPM

Fan speed set: 89 %

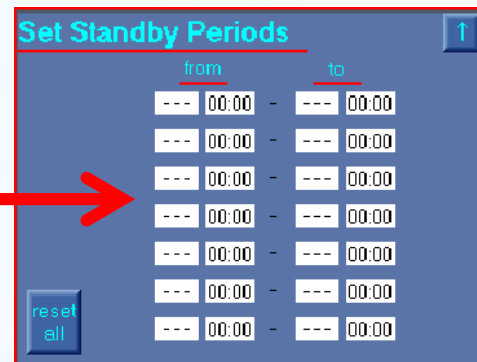
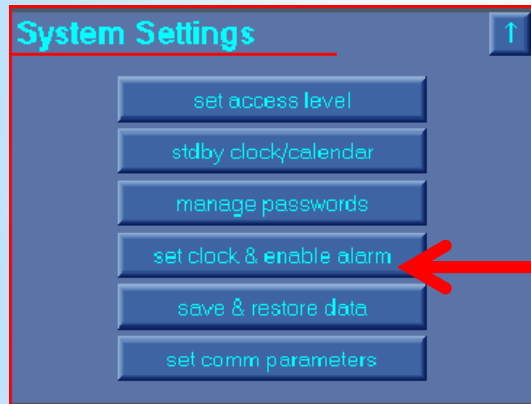
Change fan state:

Offline **Auto** Run Stdby Stop Node #: 1



Set-Back for Energy Savings

Automatic Adjustment Clock/Calendar



Occupancy Sensor Adjustment

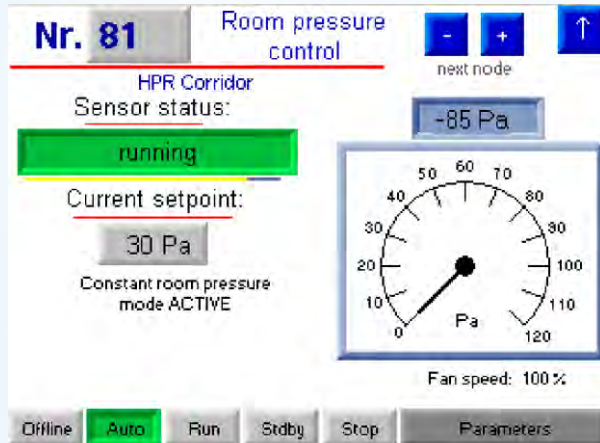


SET-Back

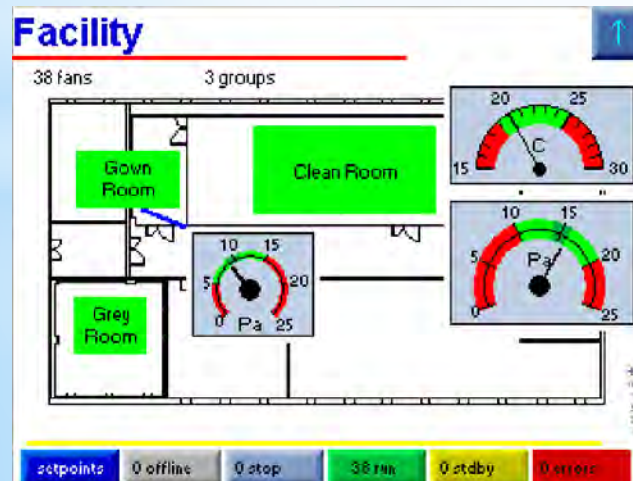
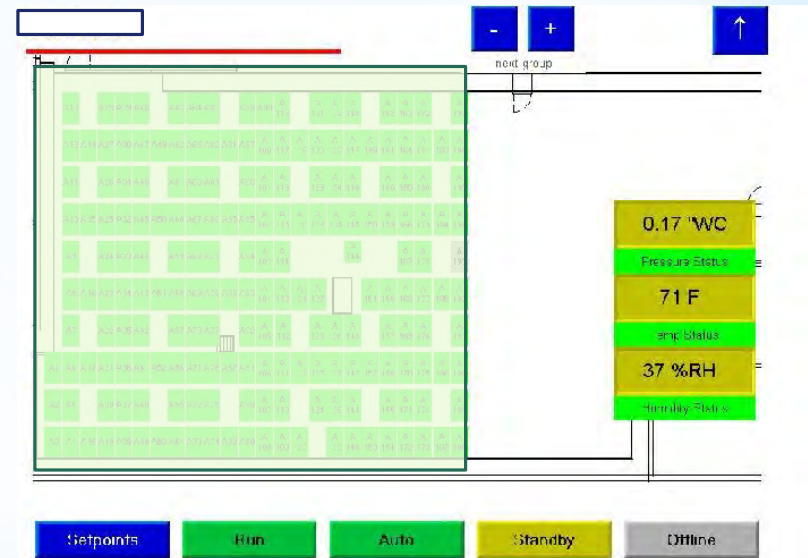


SENSOR Monitoring

Individual Sensor Views (pressure)



Multiple Sensor Display (group view)



Particle Counters

HOOD A

Particle counter #1

Alarm 75

Warn 25

Norm 0

0 - .5u

Particle counter #1 Status

next group

F-1 BDD1

F-2 BDD2

0.100 0.000 0.100

0.200 0.200

0.300 0.300

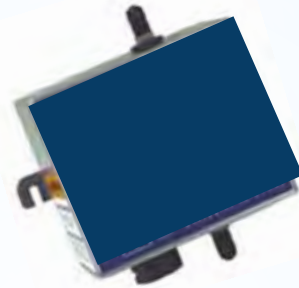
0.400 0.400

0.500 0.500

VC

running

setpoints 0 offline 0 stop 4 run 0 stdby 0 errors



Particle counter set-up

1 Hood A, Particle Counter 1

Holding regs: 40000

commands 1

status 0

flow rate 10

sample time 20

chn1 ct (H) 0

chn1 ct (L) 0

chn2 ct (H) 0

chn2 ct (L) 0



Nr. 7 Particle Counter

Hood A

Sensor status: running

0.5u count 0

5u count 0

TSI status 0

Minimum 0

Warning 25

Alarm 75

Max 89999999

Offline Online

Fault delay 90

Modbus address: 1



Automatic Control Mode

Closed Loop Control


Nr. 81 Room pressure control

HPR Corridor
Sensor status: **running**

Current setpoint: **30 Pa**

Constant room pressure mode ACTIVE

-85 Pa



Fan speed: 100%

Offline Auto Run Stdby Stop Parameters



Nr.81 Setpoints

HPR Corridor

Run setpoint: **30 Pa**

Stdby setpoint: **15 Pa**

High limit: **100**

Low limit: **0**

Constant room pressure mode is ACTIVE

PID Parameters

P	I	D	t
1	1	1	0

Auto-tune

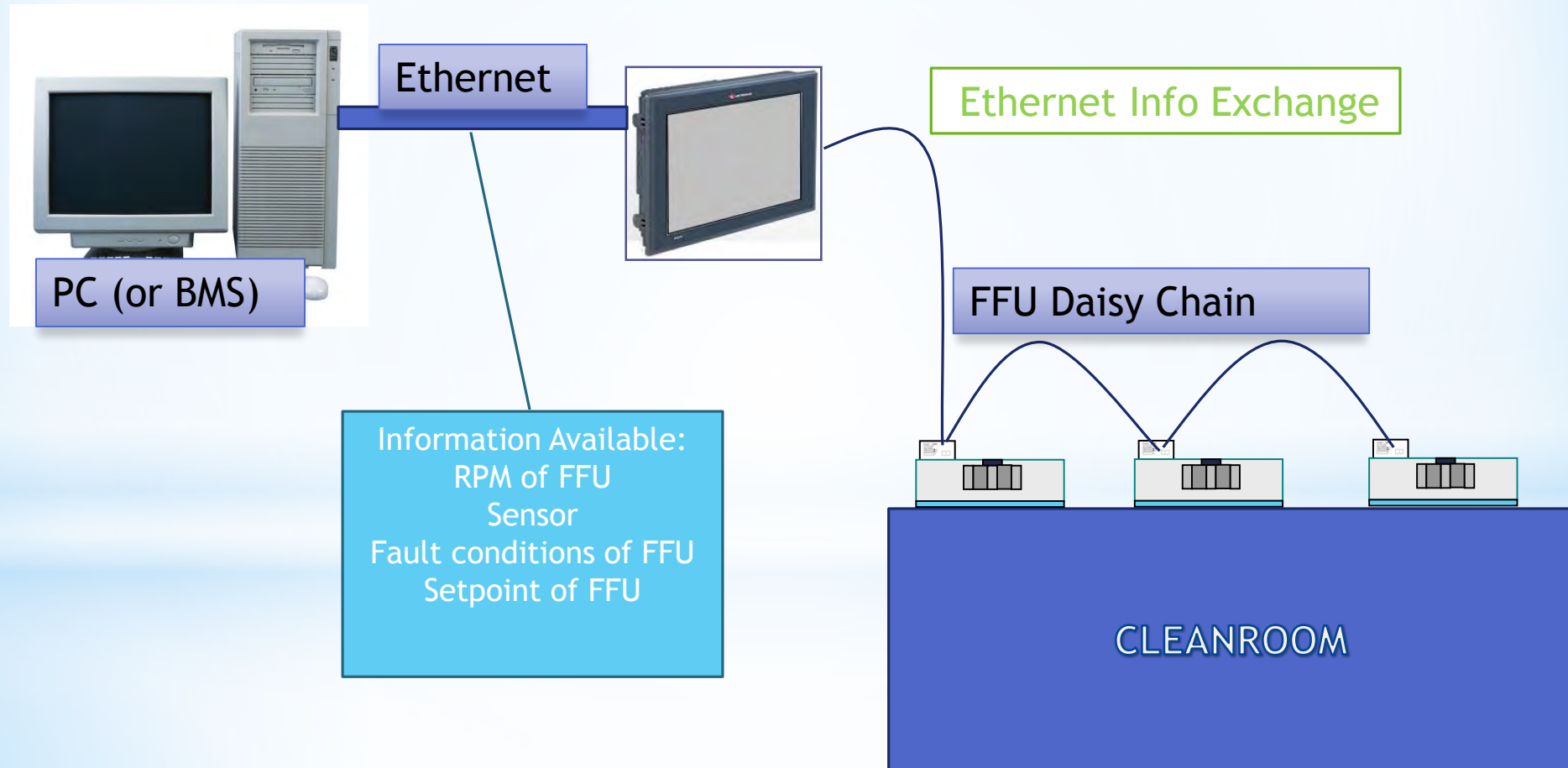
start ready

PID Status: **10** Modbus address: **3**

Min fan %	Sensor min	Sensor max	Fault delay
0	-100	100	5

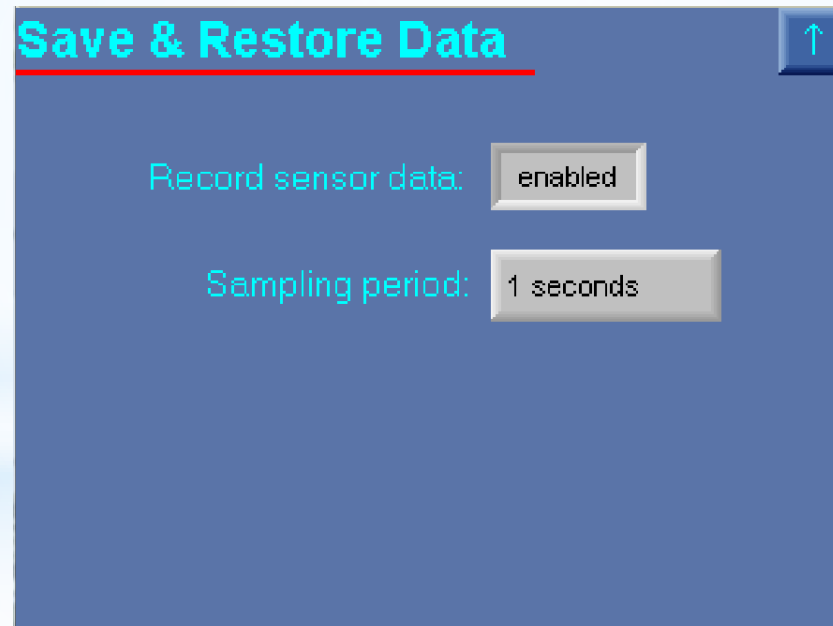


Building Management Coordination



*Data Logging/Recording

Data from the sensors (or FFU units) can be recorded to the SD card installed in the ACC70xx and transferred for analysis



The screenshot shows a blue menu titled "Save & Restore Data" with a red underline and an upward arrow icon in the top right corner. Below the title, there are two settings:

- "Record sensor data:" followed by a button labeled "enabled".
- "Sampling period:" followed by a button labeled "1 seconds".



Set-Up assistance (i.e. ebm fan assign address)

Nr. 2 EBM EC FFU - + ↑
next node

FFUs
Fan status:

Current setpoint:
High limit:
Low limit:

Nr. 2 Assign new address ↑

IMPORTANT: Only one FFU can now be powered on LAN#: 1

ebmBUS g# -f#: 1 -2
max RPM: 1400
setpoint rating factor: 100 %

FFU ASSIGNED

operational settings:

SWU	WU	SR	EIR	SWS	setup	LR	RSprio
ON	OFF	OFF	OFF	ON	OFF	OFF	ON

fan status:

motor	hall	motor	FAN	PIC	heatsink
free	sensor	temp	OKAY	comm	temp

Cleanroom Controls - Summary

- * Consolidate monitoring onto one common platform
- * Measure and record critical data
- * Advance warning for pending performance changes and issues
- * Control and Adjust FFU units to maintain cleanroom performance
- * Optimize performance to meet specific facility targets
- * Reduce Energy consumption when possible

** ENVIRONMENTAL MONITORING*

** ADJUSTMENT IN REAL TIME*

** CLEANROOM CONTROL*

** PERFORMANCE OPTIMIZATION*

RESULTS - Reduced down-time, Improved yields, Energy conservation



Thank You

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2015

